

# AMPHIPOD NEWSLETTER

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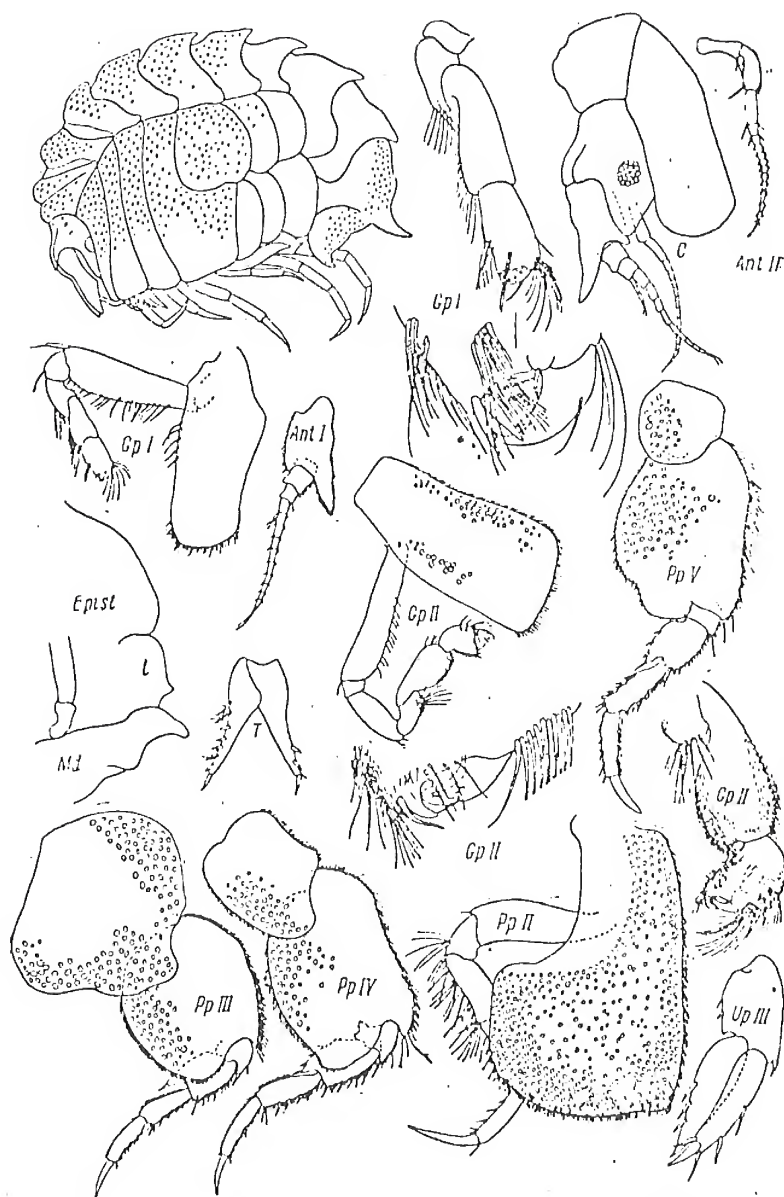


Рис. 108. *Lepidoporeum somatum* Gurjanova sp. n. Восточное побережье о. Итуруп, ♂.

AMPHIPOD NEWSLETTER 10

September 1978

I wrote in the introduction to A.N. 9, that that issue was "a few months delayed". This has unfortunately proved to be a considerable understatement. Problems with ZooTax which I had not the energy to overcome as quickly as I should have, produced the trouble, and we must be very grateful to Les Watling for getting the Newsletter afloat again. Fortunately, I had already collected a number of contributions for A.N. 10, so we hope to have this in your hands before Christmas, even for those who have to wait longest for their surface mail.

I must apologize for two curious mistakes in A.N. 9. The piece on amphipod collections in the Hamburg Museum was written by Hans-Georg Andres, and Drs. Williams, Wolff and Yoo were inadvertently omitted from the list of subscribers.

I have solicited several abstracts of unpublished theses on amphipods for this newsletter, while Marion van Haren has contributed a bibliography on amphipods and Acanthocephala. Please let me know what you think of this type of contribution.

Deadline for A.N. 11 will be 15 January. In it it would be nice to have an index of the new amphipod genera (at least) mentioned in the bibliographies of A.N. 1-10. Any volunteers?

Cover: Taken from Gurjanova (1962), *Bokoplavy severnoi chasti Taxogo Okeana* (Amphipoda-Gammaridea). If anyone has an illustration, humorous or technical, that they would like to see on a future cover, please feel free to send it to Wim Vader or Les Watling. It must, however, fit on the cover without reduction.

Subscriptions: Please send the equivalent of US \$3.00 to your regional collector (or more if you can) in the next month or so to cover the projected expenses of A.N. 11 and 12. Those of you outside the U.S. will receive your A.N.'s by air, thus the increase in cost. Also, the mailing list has been computerized, and the mailing of the A.N. should occur much more rapidly with A.N. 11.

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Marion van Maren

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## ABSTRACTS OF UNPUBLISHED THESES

In A.N. 9 the so-called "abstract" of Michael Besner's thesis was in reality just a list of contents. The real abstract of the major paper is given below.

Michael Besner

(see A.N. 9 p. 16.W.V.)

### ABSTRACT

Annual ecological structure of gammaridean amphipod associations in the hyperbenthos and endobenthos of a shelf mud bottom in the Lower St. Lawrence Estuary in 1970 and 1971.

Mean absolute densities and relative frequencies of 81 gammaridean species are compared on a yearly basis and clustered into 6 categories of importance in the association, using 177 day and night samples from a Macer-GIROQ hyperbenthic sled (standard nets at 2 levels, 10-46 and 106-142 cm from the sea-bed, 28400 m<sup>3</sup> of water filtered on .5-mm meshes), and 47 anchored dredge samples (33.5 m<sup>2</sup>x6 cm of mud sieved on 1-mm meshes), at the same monitoring station occupied from June to October in 1970 and 1971. The environment was very uniform: flat ground, 120 m depth, temp. 1-3.4°C, sal. 32-33‰.

The Eusiridae Rhachotropis oculata (23-49% of individuals), Oedicerotidae (13-24%) and Lysianassidae (13-14%) dominated the 75 species caught at the 2 hyperbenthic levels in 1970 (3.07 indiv./m<sup>3</sup>) and in 1971 (1.23 indiv./m<sup>3</sup>). The Lilljeborgiidae Idunella aequicornis (59% of individuals) and Ampeliscidae (Haploops tubicola dominant) were predominant among the 31 species caught in the endobenthos in 1970 (23.3 indiv./m<sup>3</sup>) and in 1971 (40.7 indiv./m<sup>3</sup>). The close relation between the frequency and log density of each species in either year suggests a homogeneous hyperbenthic association at both levels, but diluted on top, and contagious distributions for some species, which may be interpreted.

Total hyperbenthic density in the upper net was 7 times lower than in the lower net in 1970, and 15 times in 1971; deprived of R. oculata, whose density was stable from 1970 to 1971, and transformed into indiv./m<sup>2</sup>, it decreased geometrically (23.33: 1.17: .04) from the endobenthos to the upper net level in 1970, but not in 1971 (40.59: .31: .01). The higher hyperbenthic diversity in 1970 was more nearly the same in both nets than in 1971, and lower at night and in the upper net. Weaker vertical migrations in 1971 are inferred, less involving hyperbenthic species, which depend less on the seafloor, than epi- and endobenthic ones, whose mean density in the dredge tended to vary from that of the lower net, if species were compared.

In 49 species, ranked on a gradient of swimming activity through ratios between their frequencies at the 3 levels, absence from the dredge generally goes with high hyperbenthic ratios, and vice versa. These results agree well with the known autecology of the species, reviewed here, but Oedicerotidae and Lysianassidae therein appear better swimmers than burrowers, probably because of their agility to escape from the dredge. Genera of the same family often have quantifiable ecological kinships which allow an ecological grouping of families.

Compared with a mud association at the same depth in Baie des Chaleurs (Gulf of St. Lawrence), that of the Estuary has only 45% in common with the other, (a) includes fewer Oedicerotidae, (b) more (16%) bathyal and stenothermic (2-5°C) species which are absent (1-2%) from the colder water of the Bay, and fewer (24%) arctic species than that of the Bay (37-40%), and (c) does not swim so far away from the sea-bed. These differences would be due, in the Estuary community, (a) to a poorer clay content in the mud, (b) to its slightly warmer (by .5-1.5°C) waters, which are closer to the continental slope of the Laurentian Channel, and (c) to its less transparent water at the surface.



## ABSTRACT OF THE DISSERTATION

Orientation Behavior in Beachhoppers of the Genus Orchestoidea:  
Capacities and Strategies

Robert Frank Hartwick, Doctor of Philosophy, in Biological Oceanography  
University of California, San Diego, 1975.  
Professor James T. Enright, Chairman.

The special stresses of life in the intertidal zone have induced an array of complex adaptations among the inhabitant species of the shoreline. In freely motile animals, a means of guiding their locomotion on a compass bearing toward their preferred habitat from the landward or seaward extremes of the zone is, apparently, a behavioral adaptation of some importance. Talitrid amphipods, the common "beachhoppers" which dwell in sandy beaches near the high tide strandline, have been shown to possess several orientation responses which may serve the purpose. Because each response has basic limitations in reliability, it may be that different information sources are relied upon, in turn or in chorus, to optimize the orientation strategy.

In this study, talitrids of the genus Orchestoidea were tested in both field and open-air laboratory experiments to reveal details of their orientation capacities and strategies. In a rooftop sun-orientation chamber, designed for replicate releases of individual amphipods, it was shown that at least 90% of all animals tested (N=1724) have a significant ability to relocate a specific compass bearing over 8 or more replicate tests. Animals from a given population show rather good agreement in this chosen direction, which corresponds, within a margin of error, to the seaward bearing on the population's home beach. The position of the sun is the only obvious directional cue available during the chamber tests, and talitrids apparently can adjust their menotactic orientation angle throughout the day to compensate for changes in sun azimuth. Whether this compensation corresponds perfectly with the complex acceleration function of sun azimuth is questionable, although the data are not adequate to settle the issue. A number of sources of orientation variability - both between and within individuals - arising from both motivational changes and environmental parameters, have been considered at some length.

Directional cues local to the beach habitat can also be perceived by Orchestoidea, and are used, in preference to celestial information, when the two sources conflict. When an animal is displaced from its home beach to one with a markedly differing compass bearing, it will, when released on the lower beach, move in the landward direction for the new beach. The nature of the critical local cue has been suggested by other displacement experiments to a beach which lacks high background landmarks (cliffs, etc.). Here the animals show little or no correction to local stimuli, but instead move on the bearing appropriate to their home beach, apparently using celestial information. Correction to local cues does not, apparently, realign the internal celestial compass bearing after a brief exposure to a new beach, since displaced animals revert to their home beach orientation in the chamber.

A talitrid population has been found with a highly abnormal orientation response in the chamber. These animals live on a beach which is bathed by strong floodlights every night. They have apparently learned to orient at a constant menotactic angle to these lights while moving across the beach, and this nocturnal response has been carried over into their diurnal response to the sun. This suggests that diurnal and nocturnal celestial responses - the sun and moon compasses - are linked subsystems in a unified menotactic mechanism, with the latter taking the dominant role.

It is probable that the orientation behavior of talitrid amphipods integrates directional information from several sources, including, at least, visual cues from celestial bodies and landmarks, and possibly also non-visual information from the wind, beach slope, and other sources. The various orientation mechanisms of beachhoppers appear to be arranged in some form of dominance hierarchy, in that large landmarks, when available, are preferred as directional cues over celestial bodies, which, in turn, dominate non-visual cues. Such a hierarchy probably reflects the relative degrees of reliability in the different responses.

## ABSTRACT OF THE DISSERTATION

The Role of *Orchestia grillus* (Talitridae, Amphipoda) in the decomposition of *Spartina alterniflora* litter

Glenn Robert Lopez, Doctor of Philosophy in Department of Biological Sciences (Ecology and Evolution), State University of New York at Stony Brook. 1976.

Orchestia grillus is one of the most abundant litter-feeding macroinvertebrates in the wrack zone of Spartina salt marshes on the Atlantic coast of North America. A series of laboratory experiments was conducted to determine the role of Orchestia in Spartina litter breakdown, emphasizing interactions between amphipods and micro-organisms growing on the litter. Decomposition rates of litter and assimilation efficiencies were determined using carbon, nitrogen, and gravimetric analyses. ATP determinations provided estimates of microbial biomass.

Orchestia stimulates microbial decomposition of Spartina litter, especially the nitrogen fraction, through direct grazing on the microorganisms. The amphipods do not appear to digest Spartina litter, but obtain their nutrition by efficiently assimilating living microorganisms growing on litter particles.

Amphipods may increase microbial biomass on decomposing litter through ammonia excretion and by stirring the water through locomotor activities.

Net mineralization (weight loss) of Spartina litter proceeds at a low rate and is not affected by amphipod grazing.

Microbial debris, consisting of dead cells, cements, and exudates, can become a quantitatively important fraction of Spartina detritus under certain conditions. This material is also not digested by Orchestia.

## ABSTRACT OF THE DISSERTATION

SPATIAL AND ASSOCIATIONAL PATTERN IN THE HYPERIID AMPHIPOD ASSEMBLAGE  
OF THE NORTH PACIFIC CENTRAL GYRE

Eric Shulenberger, Doctor of Philosophy in Oceanography,  
University of California, San Diego, 1976.

Professor John A. McGowan, Chairman

The North Pacific central gyre appears to be a genuine marine ecosystem; in this, it appears much unlike many other intensively-studied marine regions. Two of the first steps in the analysis of any ecosystem are to ask (1) what species occur in the system and (2) what are the patterns of distribution of these species within the system? These are the basic questions which are approached by this research, for the hyperiid amphipods occurring in the gyre. A detailed examination of gyral hyperiids has delineated strong patterns in both inter-species associations and spatial distributions. These findings of pattern lead naturally to a consideration of possible regulatory mechanisms for the observed structure.

To answer the first question (what species occur in the system), the hyperiid amphipods have been examined from an extensive series of depth-stratified bongo net tows taken at 28°N, 155°W in the North Pacific central gyre. Seventy-nine samples from six depth intervals produced 14,581 individuals belonging to 13 families, 42 genera, and 83 species. Data on depth distributions, rank-order of species abundance, sex ratios, and vertical migration are also presented (Chapter I). Most of these species are shown to be reproductively active in the gyre, and there appears to be no seasonality to their reproductive behavior. No species endemic to the gyre are yet known.

Chapter II seeks pattern among hyperiid species: Hutchinson's "paradox of the plankton" reappears. There are very many species, apparently coexisting in equilibrium although many are very closely related taxonomically and appear functionally similar.

The gyre is highly oligotrophic and these species should be in competition for a limiting resource (food): the high number of species present and their coexistence constitute the "paradox".

An attempt is made to consider the paradox (Chapter II) by analyzing the hyperiid data using recurrent group analysis. This analytical technique separated 20 species (totalling among them 90% of captured individuals) into six groups. Members of a group co-occur in samples very frequently (probably much more frequently than can be attributed to random co-occurrences). The groups are not strongly interconnected and display different depth distributions and vertical migratory behaviors.

Several groups contain, paradoxically, sets of congeneric species, in apparent violation of the competitive exclusion principle. Detailed analyses of three sets of congeners (one pair not grouped together and two sets grouped together) has shown behavioral differences between congeners. These differences, although subtle, are probably biologically significant in permitting coexistence of these closely-related species.

Three general questions are considered (Chapter II). (1) Will traditional niche-oriented concepts work in epipelagic zooplankton ecology? The answer appears to be yes; several niche axes have been identified for several hyperiid species. (2) Can these concepts be used to help resolve the paradox? Again, apparently yes; even congeneric species found grouped together can be separated along some (or several) niche axis. However, only 20 of 83 species are considered; data are insufficient on the remaining 63 species (which only include 10% of captured individuals). (3) Regulatory mechanisms for gyral community structure are discussed; apparently neither competition nor predation alone is sufficient. Different aspects of community structure are probably generated during different parts of species' life histories, and probably by different mechanisms.

THE EFFECTED LIGHT ON THE LOCOMOTOR RHYTHM AND GENERAL BIOLOGY OF  
TALITRUS SALTATOR (MONTAGU).

J.A. Williams

The aim of the present study was to investigate aspects of the locomotor activity rhythm of Talitrus saltator (Montagu), with particular emphasis on the environmental synchronization of the rhythm. The seasonal pattern of reproduction, the effect of photoperiod on aspects of reproductive biology, and the seasonal field distribution of T. saltator were also investigated.

Under laboratory conditions the nocturnal locomotor rhythm of T. saltator was shown to be precise and persistent with an innate circadian frequency of approximately 24.4 hrs. The expression of the rhythm is synchronized by incident LD cycles and is independent of cyclic fluctuations in relative humidity and temperature. The periodicity of the rhythm is also temperature independent ( $Q_{10}=1.01$ ). Intraspecific variations of the rhythm and laboratory induced variations associated with actograph design were examined.

A semi-lunar endogenous rhythm regulating the amount of activity/ 24 hrs was demonstrated in the free running locomotor rhythm, with maximum activity correlated with the time of the nocturnal, high spring tides.

The mode of light entrainment of the locomotor rhythm was characterized, the LD cycle being shown to act as a differential synchronizer of the rhythm. Entrainment occurred through the action of transient phase shifts of the rhythm. The range of entrainment of the rhythm to symmetrical LD cycles differing from a normal 24 hr periodicity was found to be less than 6 hrs. The locomotor rhythm more or less complied with the experimental predictions of Aschoff's 'circadian rule' concerning experimentally induced variations in the periodicity and activity time: rest time ratio of the free running rhythm subjected to LL regimes.

Seasonal analyses of the locomotor rhythm established the light-on transition period to be the effective field parameter which synchronized the rhythm, the phase of the endogenous rhythm shifting in response to seasonal changes in the time of 'dawn'. Despite the seasonal change of phase there were no significant related changes in amplitude and period of the rhythm. Experimental analyses, using simulated twilight transitions substantiated the 'dawn' transition to be the



effective synchronizer of the rhythm and showed that the threshold light intensity for synchronization of the rhythm is 3.0-4 lux.

Phase control of the rhythm by LD cycles necessitates a periodically changing sensitivity of the rhythm towards the LD cycle which can be demonstrated by a phase response curve, which is conventional in form in T. saltator. Entrainment and phase control of the rhythm by atypically phased LD cycles or nLD cycles were interpreted as the interaction of phase shifts induced in the rhythm by light stimulation of specific phases of the response curve.

The locomotor rhythms of 3 other supralittoral Peracarida, Talorchestia deshayesei, Orchestia gammarella and Ligia oceanica were also studied. All three exhibited pure circadian, endogenous rhythms. The mode and range of entrainment of T. deshayesei is similar to that of T. saltator. Synchronization of the rhythm, by LD cycles, involves a differential mode in T. deshayesei, the effective field parameter being the light-off transition with an incident intensity range of 5.0-6.0 lux required for synchronization.

A procedure for quantifying the standard periodogram analysis technique, involving computer randomization of the time-series data, is described.

The horizontal and vertical seasonal migration, within the supralittoral zone, of the T. saltator population of Derbyhaven, Isle of Man was investigated. Animals overwintered above EHWS at depths of 50 cms, in summer the population moved downshore with a concomitant reduction in the burrow depth. Endogenous rhythmicity entrained by light clearly appeared to control the timing and distribution of surface activity but navigation by T. saltator in the study area appears not to be dependent upon a time-compensated navigation mechanism related to the solar azimuth. Navigation by form vision of the skyline seems a much more likely mechanism in the populations studied.

In order to investigate the effect of incident photoperiod on the reproductive biology of T. saltator the reproductive cycle together with aspects of embryological development and field growth of T. saltator at Derbyhaven were determined. T. saltator has an annual, univoltine cycle with a period of high reproductive activity between May and late August, and brood number was shown to be dependent on the length of the incubating female and the stage of embryological development of the egg. The minimum effective photoperiod for induction of gonadal maturation in culture populations of T.

saltator is shown to be LD 14:10. Under these conditions the resultant embryological development and juvenile growth is similar to that recorded in the field. Effective winter breeding of sexually mature specimens was achieved after a refractory period of 80-90 days under LD 16:8, which implies that incident photoperiod is the major exogenous factor timing the breeding cycle and can override conflicting endogenous factors.

#### REQUESTS FOR INFORMATION etc.

##### Parathemisto

I am trying to procure some specimens of Parathemisto spp., especially P. pacifica and P. japonica, in order to follow up work on the taxonomy and comparative morphology of the group. Please send specimens to

Martin SHEADER  
Dept. of Oceanography  
The University  
Southampton SO9 5 NH  
England

#### NEWS FROM COLLEAGUES

C.S. PURUSHOTANAN: I am working on the biology of estuarine amphipods of Kerala, India.

Renate WEIGMANN-HAAS: I am working on hyperiids, especially of the German Antarctic Expedition and on a checklist of literature and species. Possibly I will publish the first results in the next year.

James P. MEADOR: My work concerns the physiological ecology of benthic amphipods.

Jim LOWRY: I have been on an extended collecting trip to Macquarie Island, a very interesting trip. We made almost 200 collections right around the island. Unfortunately we weren't able to sample deeper than 20 m, because everything was done by SCUBA without boats. The collections are being sorted now. (Also, Jim wrote about seeing over 2.5 million Royal penguins, maybe half that many King and Rockhopper penguins, about 100 000 Elephant seals and quite a few Fur seals (plus 4 spp of Albatross). (SCUBA-ing in such water cannot be a very lonely occupation).

Octavian CIOLPAN: Mes premiers études sont dirigées sur l'écologie du

genre Corophium du Delta du Danube. Bien sur je veux creuser les problèmes concernant les autres Amphipodes.

Gloria M. ALONSO: I am working on marine amphipod populations of the Patagonian coast.

Yoko WAKABARA: The following colleagues are working under my tutorship: A.S. Tararam (phytal fauna especially Amphipoda), F.P. Pereira Leite (Gammaridean life cycles), M. Takeda (Caprellidean life cycles) and M.A.G. Ribeiro (Amphipoda from stomach contents of fish).

David K. CAMP: I am beginning a survey of Leucothoidae from the continental shelf off West Florida (Gulf of Mexico). My greatest source of specimens has been from the "Hourglass cruises", a 28 month sampling program to 10 established stations off the West Florida coast between 6 and 73 m depths. Approximately 25 leucothoid species have been detected in these samples and most are undescribed.

Wolfgang ZEIDLER: I am currently working on the hyperiid fauna of Southern Australia, but as this project will be completed soon I have also started work on the gammarideans and hope to continue research in that area.

K. Peethambaran ASARI: I am working for my doctoral degree on the biosystematic studies of amphipods of Portonovo. I shall study the ecophysiological aspects too.

L. P. MADIN & G.R. MADISON: We are continuing our work on hyperiids associated with other plankton and are presently working up material for two or three more papers. Our collections at present include several thousand specimens in 30 genera of hyperiid amphipods. In addition to the natural history of their associations, we plan some work on systematics of hyperiids, but probably will not get to that for a few years. Meanwhile, we would consider loaning some of our material to others in the field if it would be useful, and can supply further details about our collection upon request (VII-77)

Edward B. HATFIELD: I am currently in a post-doctoral position with Dr. Robert A. CROKER of the University of New Hampshire. We are initiating field and laboratory experiments to determine reasons for the distribution and abundance patterns of haustoriid amphipods.

Graham D. FENWICK: My interests are broad and not restricted to amphipods alone. Within amphipodology however, I am keenly interested in ecology, taxonomy and zoogeography. Currently I am working with Dr. Jim LOWRY of the Australian Museum, Sydney, in a taxonomic and zoogeographic study of the Amphipoda of New Zealand's subantarctic Snares Islands. This is now a large project involving about 25 redescrptions, 18 new species and about five new genera. We hope to conclude this during 1978 and, once I have completed a few other projects, I hope to get back to amphipod ecology.

International Symposium on Groundwater Biology

Les Watling

This symposium, combining the 4th International Colloquim on Gammarus and Niphargus and the 2nd International Symposium on Groundwater Ecology, was held at Blacksburg, Virginia, U.S.A., on September 10-16, 1978 and was attended by 46 investigators from 14 countries. The meeting was very successfully organized by Drs. A.L. Buikema and J.R. Holsinger. In addition to the papers presented, which are listed below, there was a day-trip to some nearby karst groundwater ecosystems, and a series of discussion sessions dealing with the following topics: strategies for the protection of endangered and threatened groundwater species and ecosystems; ecological classification of groundwater fauna and standardization of groundwater biotope and ecosystem terminology; revisionary concepts of gammaroidean amphipod taxonomy with emphasis on ancestral and derived characters, evolutionary patterns and creation of higher taxa; and sampling techniques for groundwater fauna. It was decided by the group that the next meeting would be held at Lodz, Poland in late summer 1980 and would be organized by Krzysztof Jazdzewski and Andrzej Skalski. The papers presented at the meeting will be published either in the Int. J. Speleol. or in a supplement to Crustaceana.

List of papers:

KARAMAN, G., and BARNARD, J.L. Revision of Genera of the Family Gammaridae (sensu auct.).

HOLSINGER, J.R., and SKALSKI, A.W. The Taxonomy and Systematic Status of Crangonyx paxi Schellenberg (Crangonyctidae).

- GLEDHILL, T. A Redescription of Niphargus fontanus Bate (Crustacea: Amphipoda) and Designation of a Lectotype.
- SKALSKI, A.W. The Variability and Systematic Position of Three Species of Niphargus from the Caucasus.
- LEE, K.S., and KIM, H.S. On the Geographical Distribution and Variation of Gammarus pulex - Group in Korea.
- WARD, J.V., and HOLSINGER, J.R. Distribution and Habitats of Subterranean Amphipods in the Rocky Mountains of Colorado, U.S.A.
- ALOUF, N.J. Répartition des Amphipodes d'eau douce au Liban.
- SCHMINKE, H.K. Parastenocarididae (Copepoda, Harpacticoidea) from Australia and Their Zoogeographic Relationships.
- DANIELOPOL, D.L. Distribution of Ostracods in Groundwater of Northwestern Coast of Eubea (Greece).
- MAGNIEZ, G. Biogeographical and Paleobiogeographical Problems in Stenasellids (Crustacea Isopoda Asselota of Underground Waters).
- HETRICK, W.W., and GOOCH, J.L. Genetic Population Structure in an Amphipod Species.
- SKET, B., and VELKOVHR, F. The Phreatic Fauna of the Ljubljana-Plain (Yugoslavia) - Its Distribution and Zoogeographical Relationships.
- LONGLEY, G. The Edwards Aquifer: Earth's Most Diverse Groundwater Ecosystem?
- JAZDZEWSKI, K. Range Extensions of Some Gammaridean Species in European Inland Waters Caused by the Human Activity.
- MESTROV, M., and LATTINGER-PENKO, R. The Investigations of Mutual Influence Between Polluted River and Its Hyporheic.
- MACPHERSON, B.R., and STEELE, V.J. The Microanatomy of the Central Nervous System of Gammarus setosus Dementieva (Crustacea, Amphipoda). The Suboesophageal Ganglion and Ventral Ganglion Chain.
- BUIKEMA, JR., A.L., CHESTER, A., and STEEVES, III, H.R. Pseudotandry in Gammarus minus.
- DRUCUET, J. Action De L'Ecdysterone Sur Les Femelles De Gammarus pulex (L) (Crustacea Amphipodes). Effet Sur La Formation Des Couples Et Sur La Vitellogenese.
- VASSALLO, L., and STEELE, D.H. Survival and Growth of Young Gammarus lawrencianus on Different Diets.



- MATHIEU, J., and GIBERT, J. Evolution Des Teneurs En Proteines, Glucides Et Lipides D'Une Population Phreatique De Niphargus rhenorhodanensis (Crustaces, Amphipodes) Au Cours De L'Elevage Et Du Jeûne Experimental.
- GIBERT, J., and MATHIEU, J. Relation Entre Les Teneurs En Proteines, Glucides Et Lipides Chez Deux Espèces De Niphargus (Crustaces, Amphipodes) Soumis Au Jeûne Et Originaires De Deux Biotopes Differents.
- ROUX, C., ROUX, A.L., and OPDAM, Y. Repartition Ecologique Et Metabolisme Respiratoire De Gammarus roeseli (Crustaces Amphipodes).
- BULNHEIM, H.P. Studies on the Physiological Ecology of Five Euryhaline Gammarus Species.
- MATHIEU, J. Activite Locomotrice Et Metabolisme Respiratoire De Deux Populations De Niphargus rhenorhodanensis Mesures A Une Temperature De 11°C.
- COSTA, H.H. The Effects of Some Heavy Metal Pollutants on the Heart Beat of Gammarus pulex (L).
- HIROKI, M. Relation Between the Two Diel Phenomena Shown by Fresh Water Gammarids - Drift and Vertical Migration.
- MEIJERING, M.P.D. Drift, Upstream-Migration and Population Dynamics of Gammarus fossarum Koch.
- HOBBS, III, H.H. Investigations of the Troglobitic Crayfish Orconectes inermis testii (Hay) in Mayfield's Cave, Monroe County, Indiana.
- GOEDMAKERS, A., and PINKSTER, S. Migration of Fresh Water Gammarids
- LONGLEY, G., and HOLSINGER, J.R. Subterranean Amphipod Population Dynamics Based on Organisms Sampled from an Artesian Well in Texas.
- JENIO, F. The Live Cycle and Ecology of Gammarus troglophilus Hubricht and Mackin (Amphipoda: Gammaridae).
- DICKSON, G.W., and HOLSINGER, J.R. Variation Among Populations of the Troblobitic Amphipod Crustacean Crangonyx anntennatus Packard (Crangonyctidae) Living in Different Habitats, III. Populations Dynamics and Stability.
- GOEDMAKERS, A. Differences Between Populations of One Species of Freshwater Amphipods Within a Stream System.
- PINKSTER, S. Influence of Chlorinity on Reproductive Success and Distribution of Eulimno-Gammarus obtusatus and Other Estuarine Gammarids.
- DESSAIX, J., and ROUX, A.L. Structure and Dynamics of the French Upper Rhone Ecosystems X - Estimation of the Secondary Production of Gammarids in the Main Stream.
- CULVER, D.C. Some Implications on Competition for Cave Stream Communities.



BOUSFIELD, E.L. A Revised Classification and Phylogeny of Amphipod Crustaceans  
 COLE, G.A. Mandibular Palps of the North American Freshwater Species of  
Gammarus.

GIBERT, J., GINET, R., MATHIEU, J. and REYGROBELLET, J.L. Structure et  
 Fonctionnement des Écosystème du Haut-Rhône Français. VIII - Hydrologie  
 de Deux Stations Phréatiques dont L'Eau Alimente des Bras Morts IX - Analyse  
 du Peuplement de Deux Stations Phréatiques Alimentant des Bras Morts.

Symposium on the Composition and Evolution of Crustaceans in the Cold and  
 Temperate Waters of the World Ocean

Les Watling

This symposium, one of a series to be conducted as part of the U.S. -  
 U.S.S.R. Cooperative Program was held at the Duke University Marine Laboratory,  
 Beaufort, N.C., U.S.A., on October 20-22, 1978. Unfortunately, due to a series  
 of problems, no Soviet participants were able to attend the meeting. A wide  
 range of interests were represented in the papers presented. All papers will  
 be published in the Bulletin of the Biological Society of Washington. Those  
 papers of interest to amphipod workers were:

STEELE, D.H. Clinal variation in the morphology of Anonyx nugax (Phipps)  
 (Crustacea, Amphipoda).

STEELE, D.H. Zoogeography of the genus Anonyx (Crustacea, Amphipoda).

WATLING, L. Distribution and ecology of benthic Amphipoda and Cumacea from  
 the Gulf of Maine to Cape Hatteras, USA.

BOUSFIELD, E.L. The amphipod superfamily Gammaroidea in the north Pacific region:  
 Systematics and distributional ecology.

LAUBITZ, D.R. Phylogenetic relationships of the Podoceridae (Amphipoda,  
 Gammaridea).

BOWEN, M.A., SMYTH, P.O., BOESCH, D.F., VAN MONTFRANS, J. Comparative biogeography  
 of benthic macrocrustaceans of the Middle Atlantic (U.S.) continental shelf.

HERBST, G.N., WESTON, D.P., and LORMAN, J.G. The distributional response of  
 amphipod and decapod crustaceans to a sharp thermal front north off  
 Cape Hatteras, North Carolina.

GEORGE, R.Y. Behavioral and metabolic adaptations of Polar and deep-sea crustaceans.

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## BIBLIOGRAPHY

Reviews of the recent monographs of Drs. Greze and Tzvetkova are not yet ready. Dr. Akira Taniguchi has contributed an announcement of Ishitaro Arimoto's little-known monograph of Japanese caprellids. I have been away from the Museum for most of the summer, and shall be abroad most of the autumn, so I must ask for your assistance in bringing together the references for the next Newsletter.

## NEWS

Akira TANIGUCHI: Dr. I. Arimoto's monograph "Taxonomic Studies of Caprellids (Crustacea, Amphipoda, Caprellidae) found in the Japanese and Adjacent Waters, 229 pp." is now available for personal library at over-sea cost of 6,600.- (surface mail; Air mail postage will be ca. 2,000.-) This most useful book describes in English the diagnostic characteristics and distribution of 70 caprellid species found in the Japanese waters with keys to genera of Caprellinae and to species of Caprella. The book also deals with the development and sexual dimorphism of caprellids. This monograph was originally published as a part of the Special Publications from the Seto Marine Biological Laboratory, Kyoto University, Ser. III in 1976. However, since its distribution was limited to the official institutions, the Nippon Warekararui Shuppan-bu (Publishing Office of the Japanese Caprellid Research Group) plans to make the monograph, which has been cloth-covered, on sale or available for individuals. Although the book is some-what expensive, it should be the most excellent and welcome one for the amphipod people abroad as well as in Japan. The book can be ordered from:

Dr. Ishitaro Arimoto  
c/o Nippon Warekararui Shuppan-bu  
3-32-29, Narita-higashi  
Suginamiku, Tokyo  
166, Japan

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Paramelitidae n. fam., Neoniphargidae n. fam., and Crangonyctidae Bousfield, 1973 (see Holsinger 1977). 4. Niphargoidea G. Karaman, 1962, with 3 family groups: Niphargidae G. Karaman, 1962, "niphargoids with dissimilar gnathopods" (Pseudoniphargus, Allocrangonyx), "niphargoids of Madagascar (Austroniphargus)". 5. Bogidielloidea Hertzog, 1933, with 2 family groups: Bogidiellidae Hertzog, 1933 (revised) and "bogidielloids with sternal gills and unequal rami ur. 3" (Pseudocrangonyx, Procrangonyx, Sternophysinx & Paracrangonyx). 6. Melphidippoidea Stebbing, 1899, with 3 family groups: Melphidippidae Stebbing, 1899, "melphidippoids with large coxas and ur. 3 peduncle not elongate" (Hornellia, Metaceradocus, Parapherusa, Cheirocratus, Cheirocratella, Casco), and "fossorial melphidippoids" (Megaluropus). The Salentinellidae n. fam. (Salentinella and Parasalentinella are removed to the synopiid group families, the Gammarellidae n. fam. (Gammarellus, Weyprechtia) to the pontogeneiid group families (also, Awacaris Ueno is provisionally removed to the Pontogeneiidae), and the Caspicolidae Birstein, 1945 to a superfamily incertae sedis.).

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Rhachotropis caeca n. sp., R. glabra n. sp. R. grimaldii, R. inermis n. sp., R. integricauda, Idunella pirata, Kerguelenia reducta n. sp., Normanian quadrimanus, N. ? sarsi, Orchomene massiliensis n. sp. Podoprion bolivari, Podopriononella fissicaudata n. sp., Sophrosyne hispana, Tryphosella sp., Pardalisca sp., ? Pardaliscoides tenellus, Pleustidae 2 spp. indet., Dulichia cf. nordlandica, Laetmatophilus armatus, Pseudotiron bouvieri, Syrrhoe affinis, S. angulipes n. sp. and Syrrhoites pusillus)

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\* L. minimus sp. nov.



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Last minute additions

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Last second additions

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